



*GPM Planning Workshop  
May 17, 2001  
UMUC Conference Center, College Park, MD, USA*

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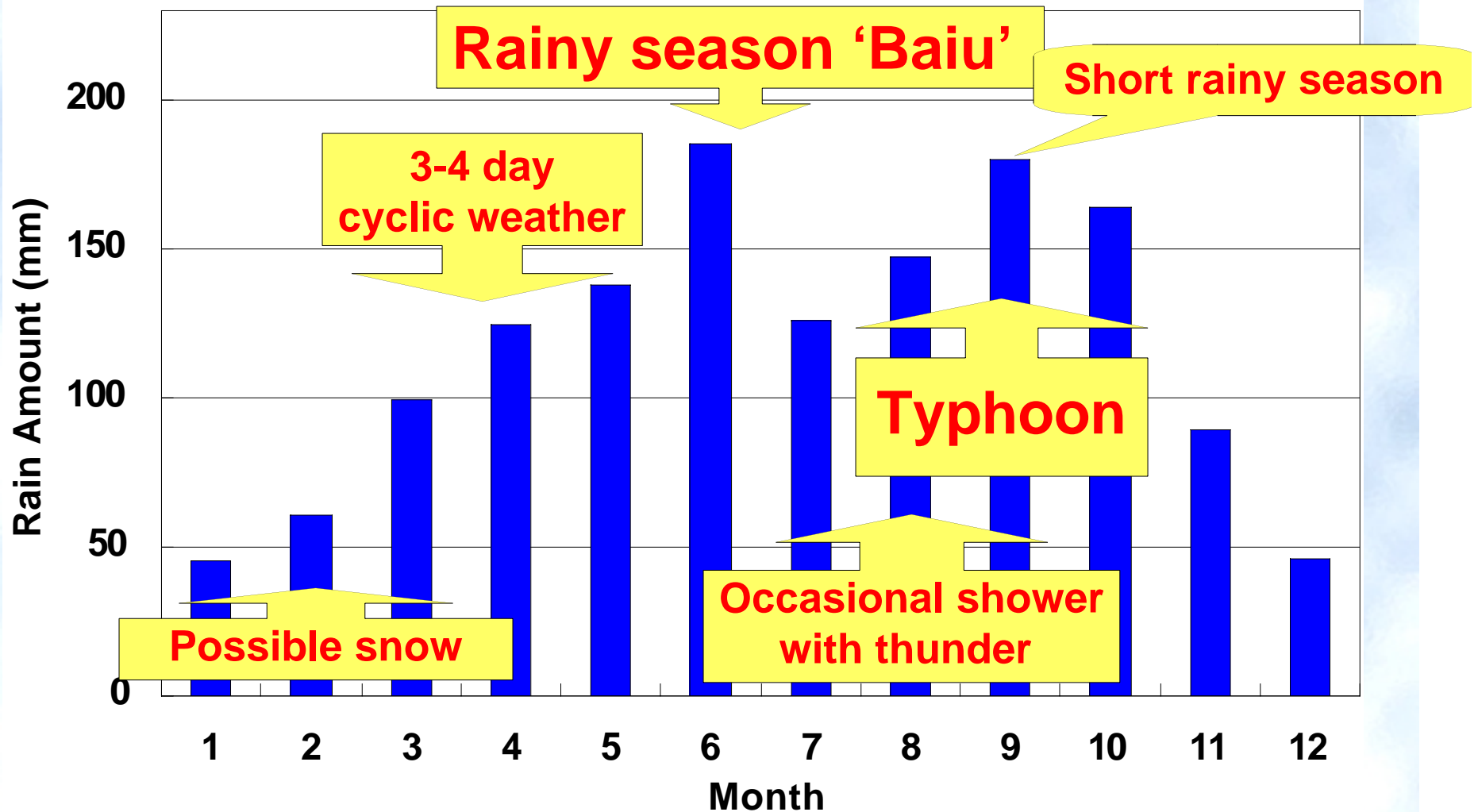
# **Satellite Data Assimilation and Its Future Plan in Japan Meteorological Agency**

**Yoshihiko Tahara**

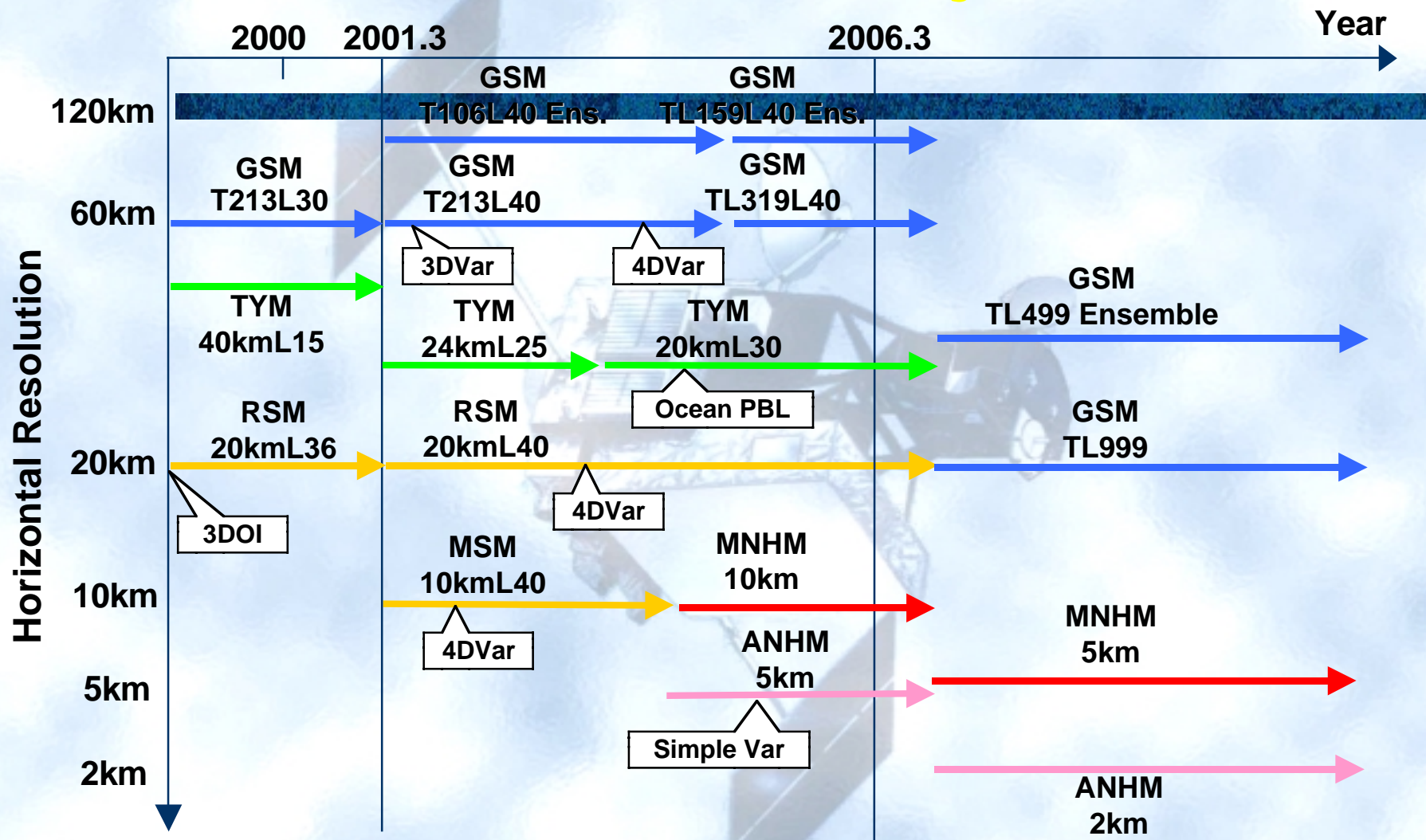
*Numerical Prediction Division, Japan Meteorological Agency  
and  
Environment Modeling Center, NCEP, NWS, NOAA*

# Why Do the Japanese Have Great Interest in Rain ?

Monthly Rain Amount in Tokyo



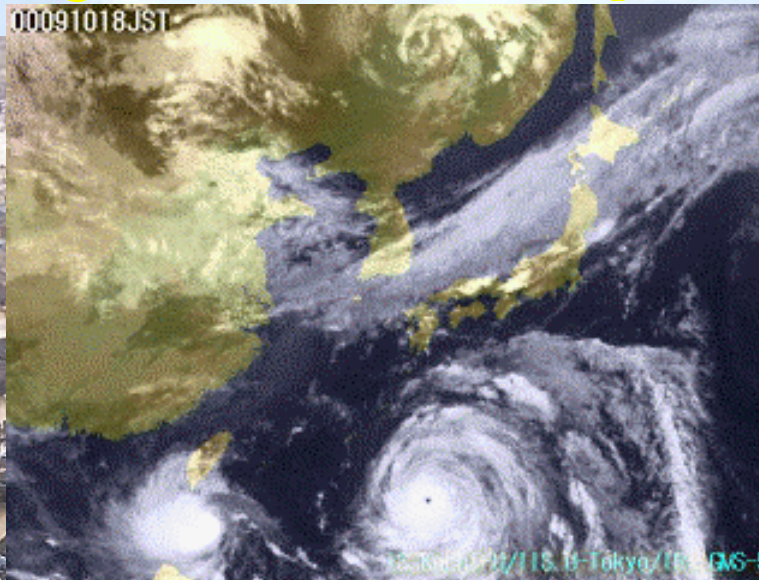
# JMA Plans for NWP systems



- Global model
 → Typhoon model
 → Regional non-hydrostatic model
- Regional hydrostatic model
 → Aviation non-hydrostatic model

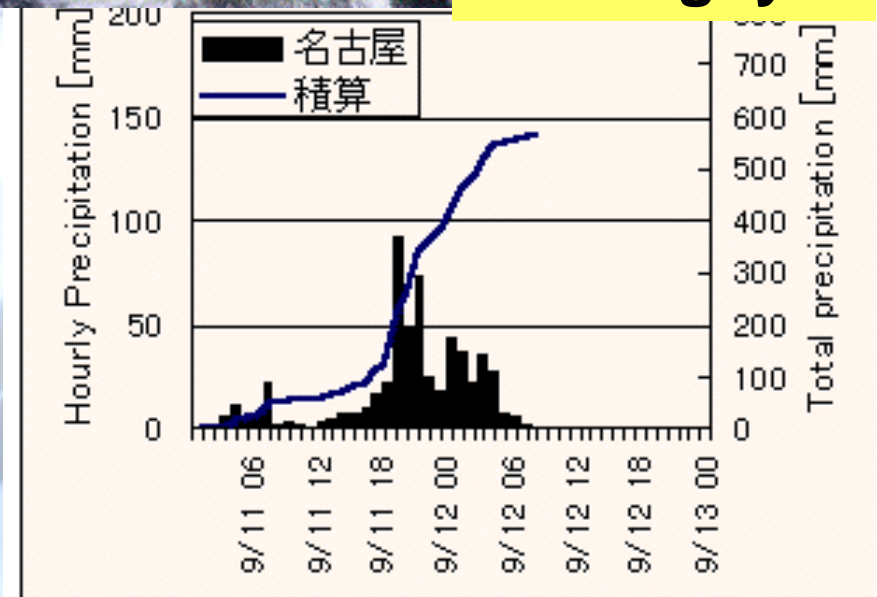


# ***Tokai Heavy Rain in Sep. 2000***



By Kochi Univ.  
Weather Info.  
[Http://weather.is.kochi-u.ac.jp](http://weather.is.kochi-u.ac.jp)

## **Precipitation at Nagoya**

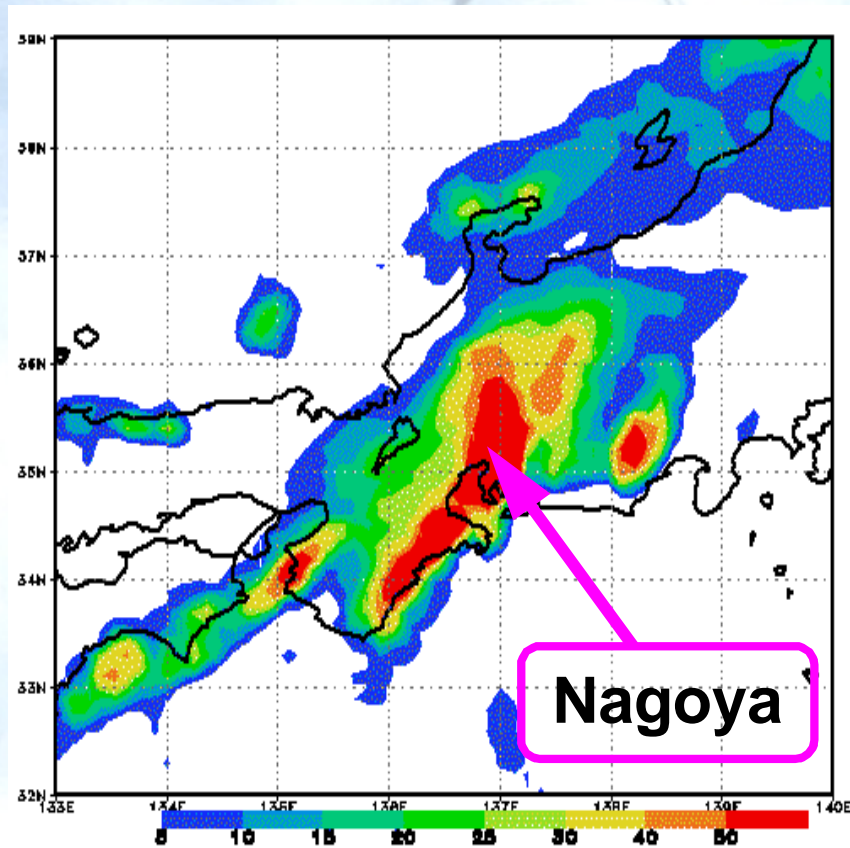


By Sankei  
morning  
newspaper  
on Sep.12, 00

By Meteo. Info. and Disaster prevention  
[fmd.dpri.kyoto-u.ac.jp/~ushiyama](http://fmd.dpri.kyoto-u.ac.jp/~ushiyama)

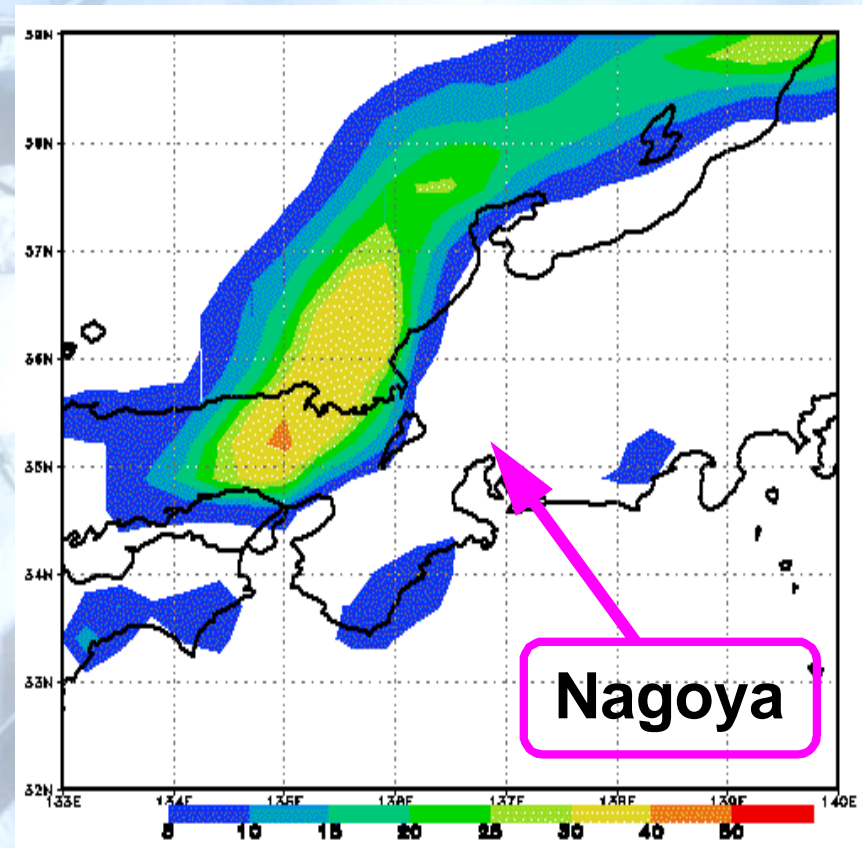
# ***Operational Forecast was...***

## **Rain Analysis by Radars-AMeDAS**



**3hrs rain for 09 - 12utc**

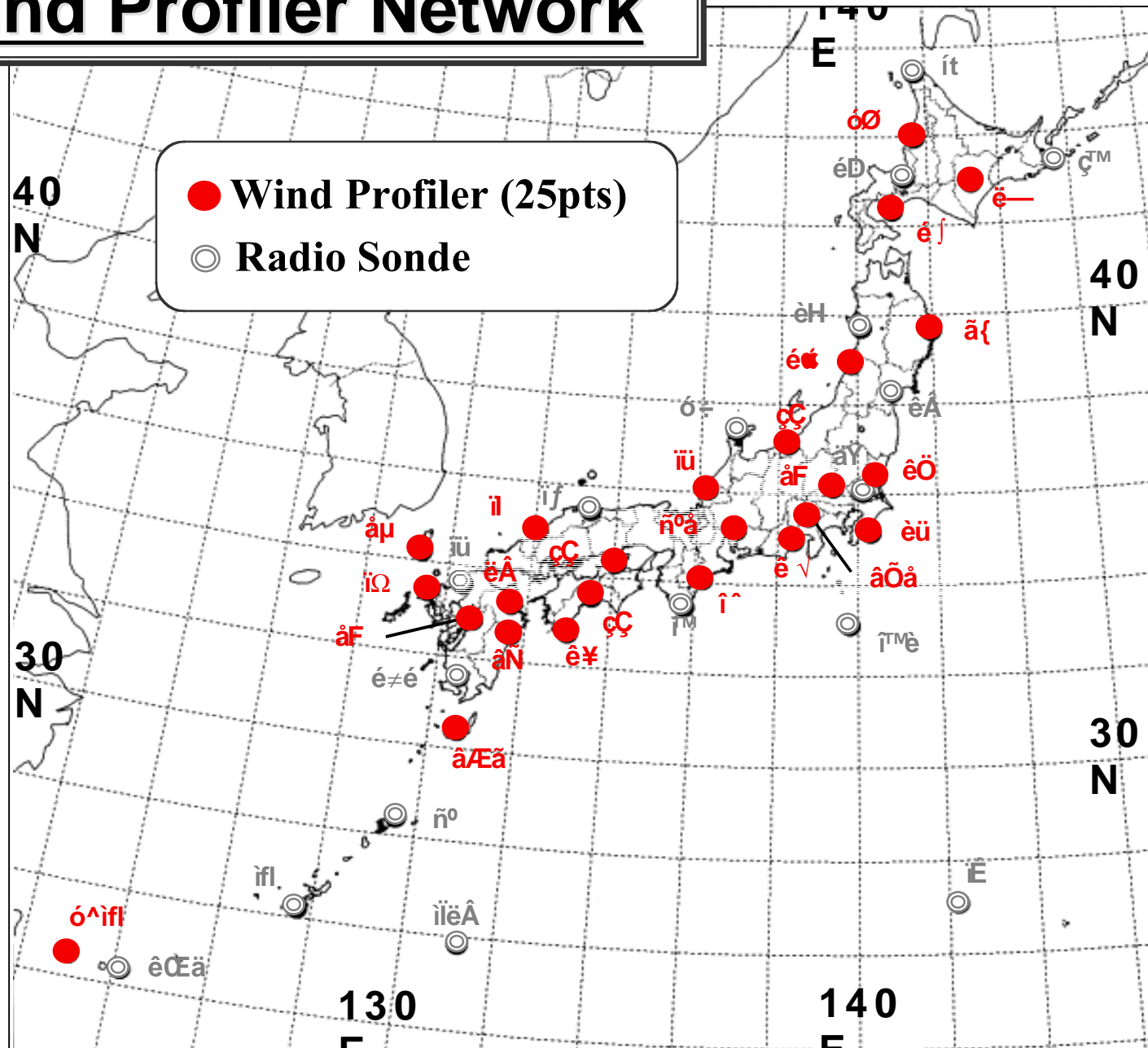
## **Forecast by RSM (20km H-res)**



**9 - 12hr forecast from 00utc on Sep11,00**



## Wind Profiler Network

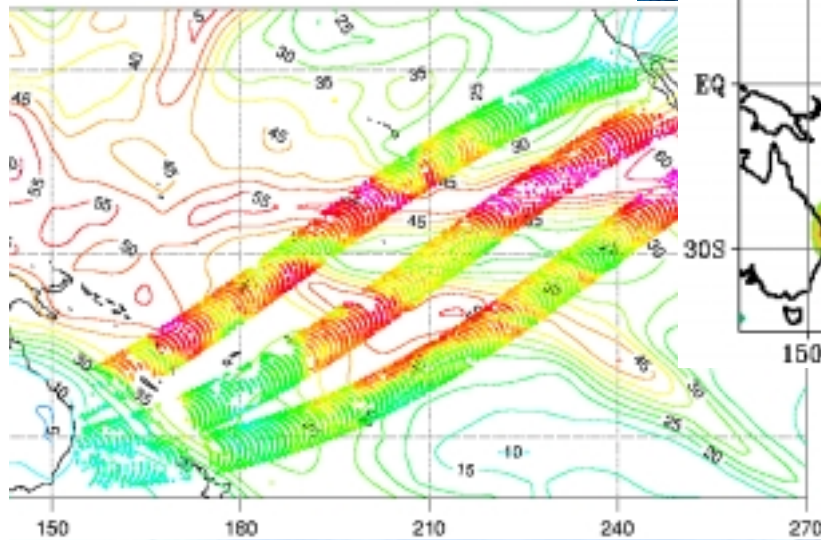


# JMA Plans for Use of Satellite Data

Satellites / Year	2001	2002	2003	2004	2005	2006	2007	2008	2009		
Geostationary Satellites											
JMA	GMS-5 [VISSR]			MTSAT-1R [JAMI]				MTSAT-2 [Imager]			
NOAA	GOES-8	GOES-11 [Imager]		GOES-N [Imager]			GOES-P [Imager]				
EUMETSAT	GOES-10 [Imager]		GOES-M [Imager]			GOES-O [Imager]					
	METEOSAT-7 [MVIRI]		MSG-1 [SEVIRI]			MSG-2					
	METEOSAT-5 [MVIRI]										
rational Polar Orbit Satellites											
NOAA (NOAA)	N-14	NOAA-16 [AVHRR, ATOVS]			NOAA-N [AVHRR, ATOVS]			NOAA-N' [AVHRR, ATOVS]			
POESS (NOAA)	NOAA-15 [AVHRR, ATOVS]		NOAA-M [AVHRR, ATOVS]								
TOP (EUMETSAT)						NPOESS Preparatory Project [CRIS, METOP-1 [HIRS, AMSU, MHS, ASCAT]					
MSP (NAVY/US)		DMSP-S14 [SSM/I] and F/O ?									
		DMSP-F13 [SSM/I] and F/O ?									
Earth Observation Satellites											
ERS (ESA)	ERS-2 [AMI]										
MM (NASDA,NASA)	TRMM [TMI, PR]							GPM [DPR, TMI F]			
uikScat (NASA)	QuikSCAT [SeaWinds]										
DEOS (NASDA)			ADEOS-II [AMSR, SeaWinds]				GCOM-B1 [AMSR]				
EOS (NASA)			EOS-PM1 [AMSR-E]			EOS-PM2 [AMSR-E, AIRS, HSB					

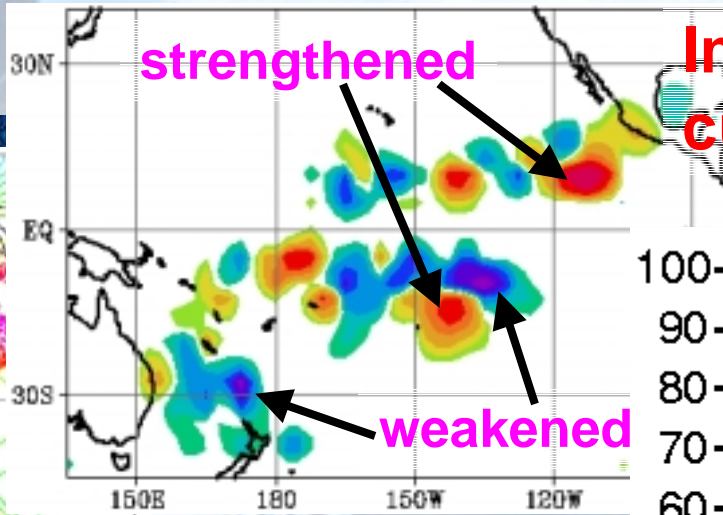
# TRMM/TMI TPW assimilation

MI PW (with guess)

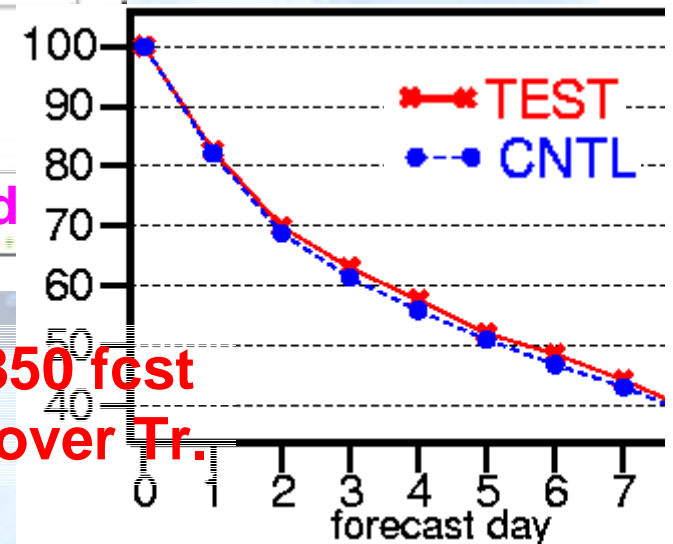


strengthened

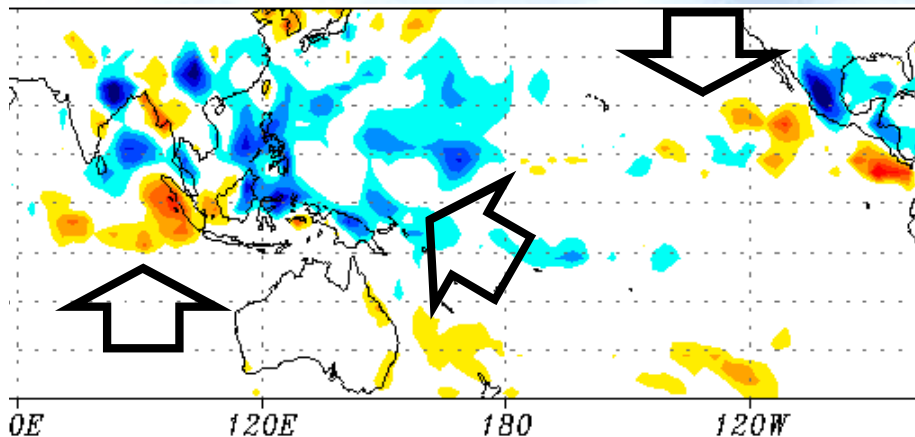
Impact on  
cumulus heating



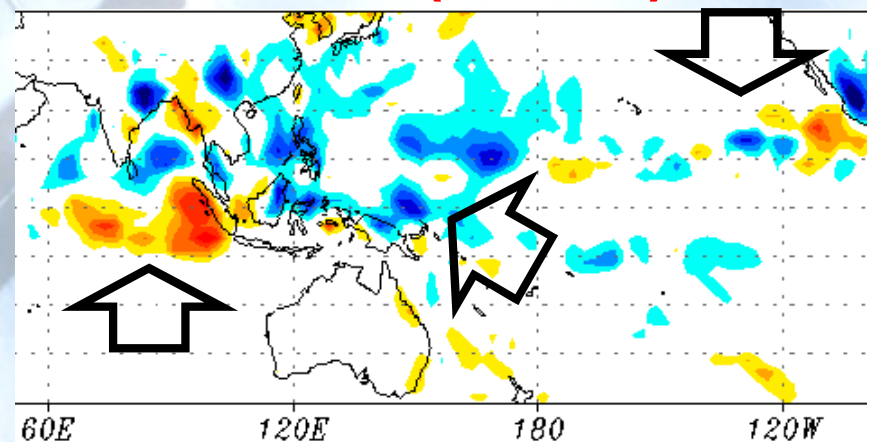
Wind850 fct  
score over Tr.



Rain Forecast Error in Aug.1998.  
Test (with TMI)



Control (no TMI)

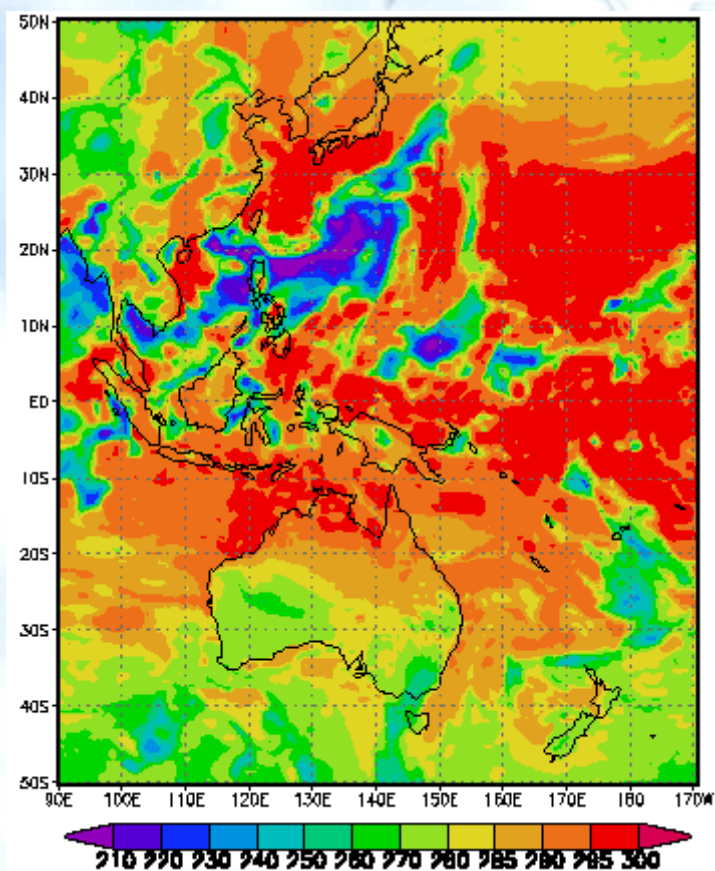




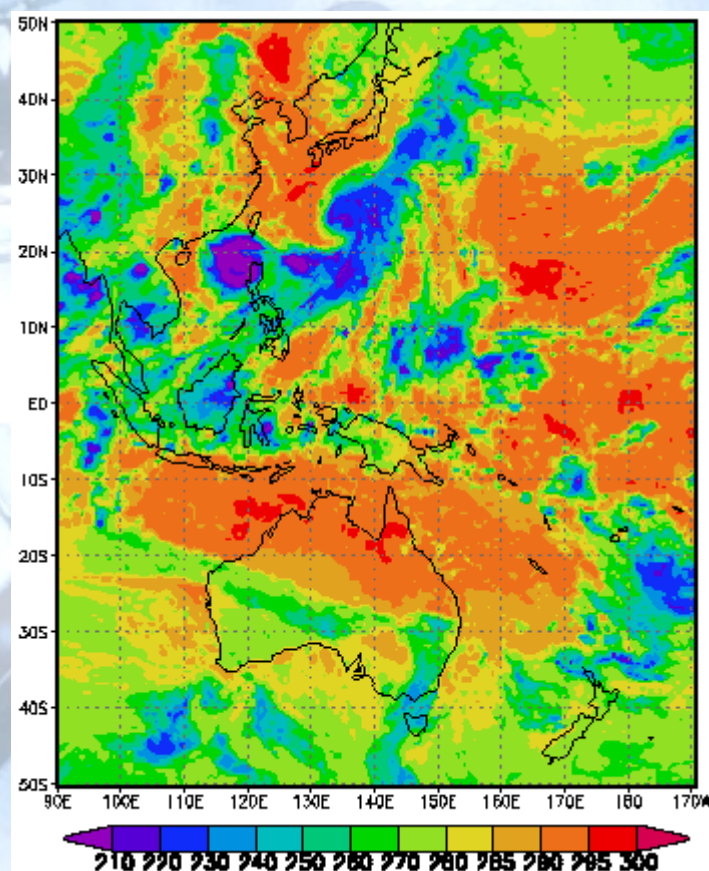
# Simulation of GMS-5 IR1 Channel (study for cloud assimilation)

(00UTC Jun2000)

**Simulated IR1**



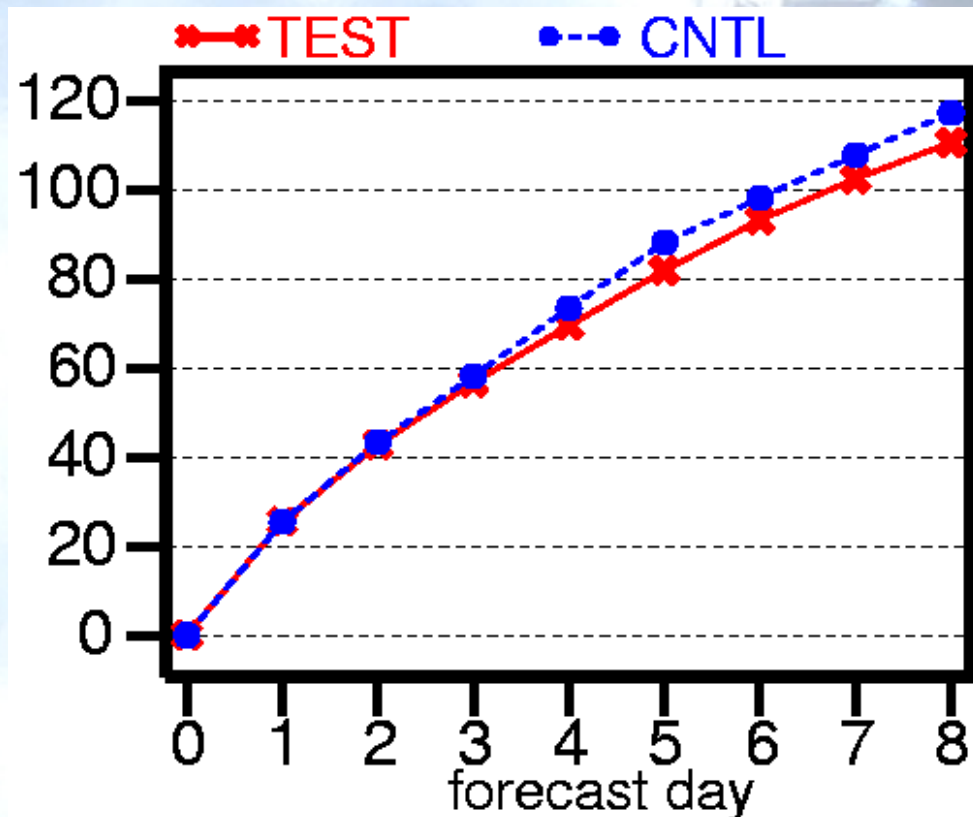
**GMS5 IR1**



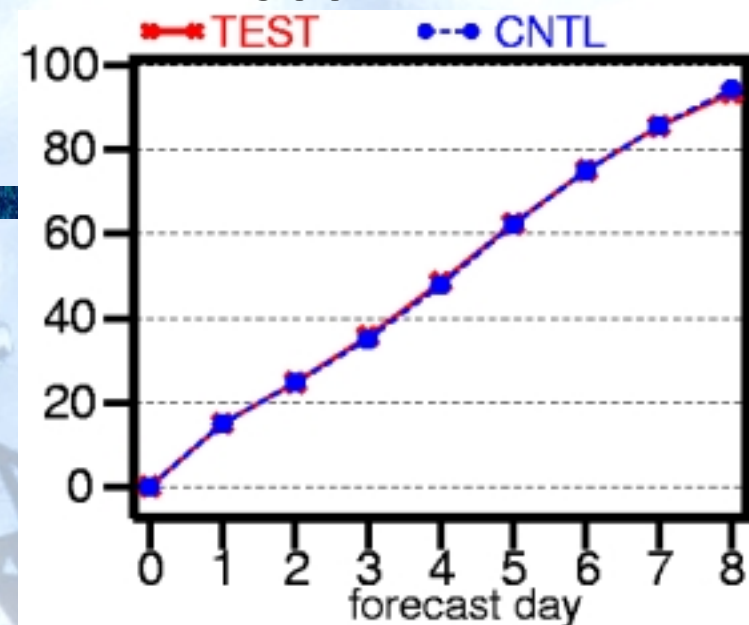
# ***Impact of TOVS 1DVAR***

**Mean RMS forecast error  
against initialized analysis,  
16 cases in Sep. 2000**

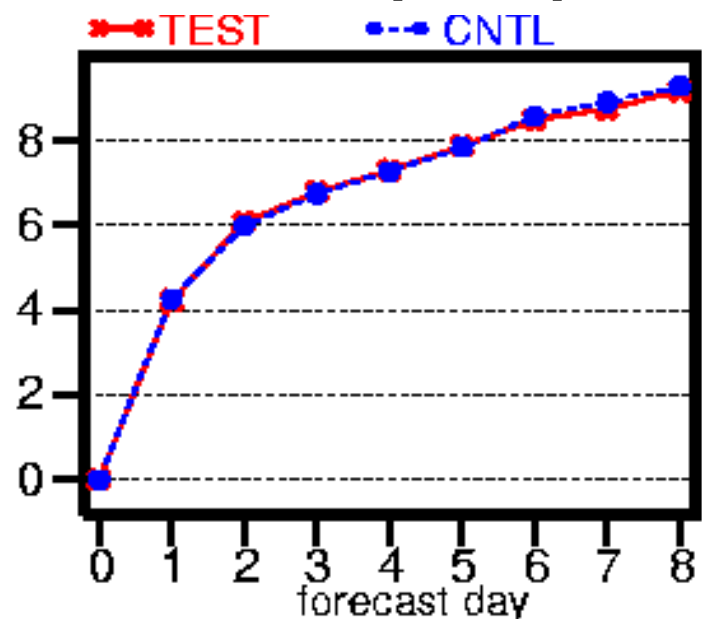
**500Z S.H.**



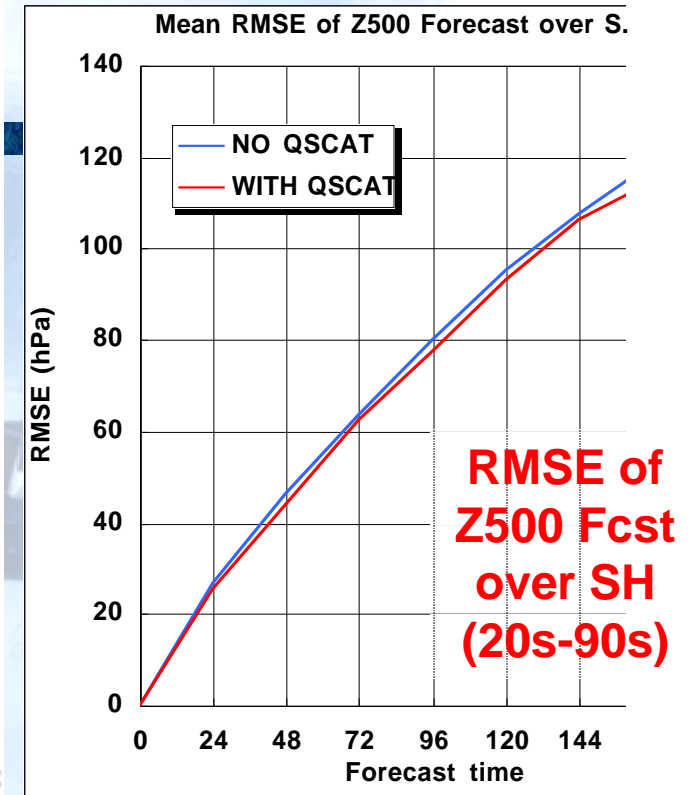
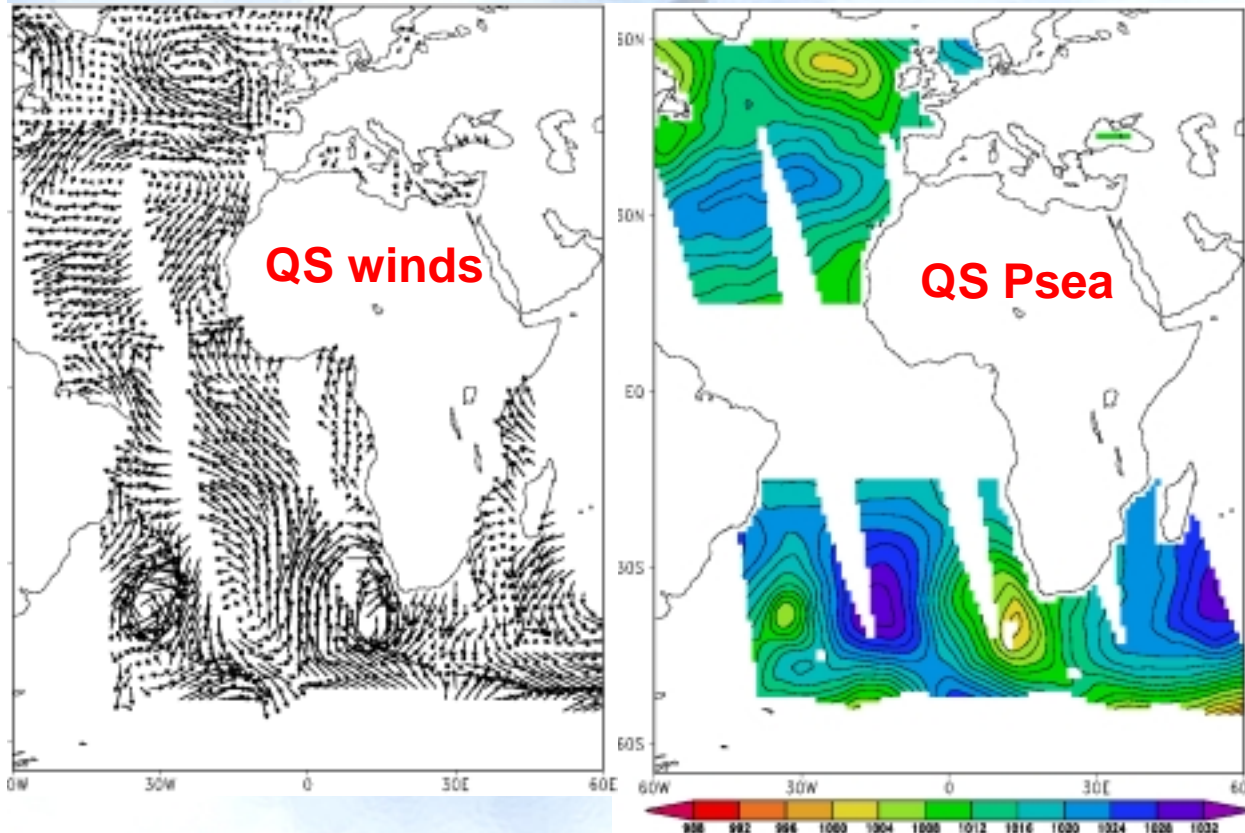
**500Z N.H.**



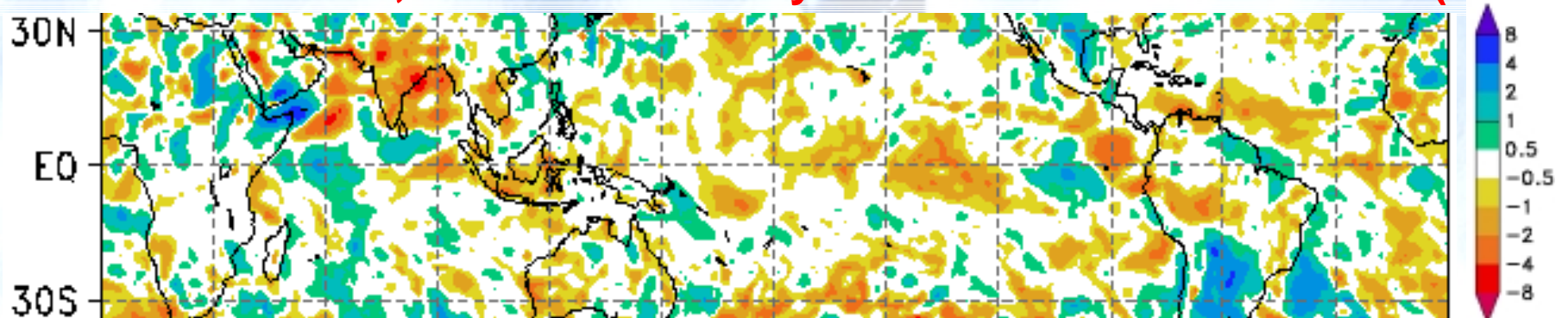
**200Ucomp Trop.**



# Impacts of QuikSCAT/SeaWinds



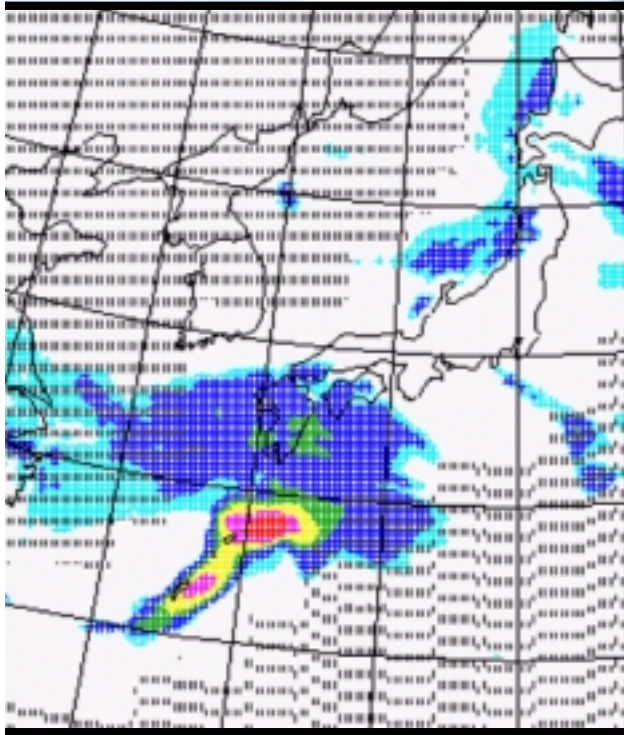
QSCAT run - Cntl run, RMSE Diff of 3day Fcsts on 850hPa Wind Vctr (m/s)



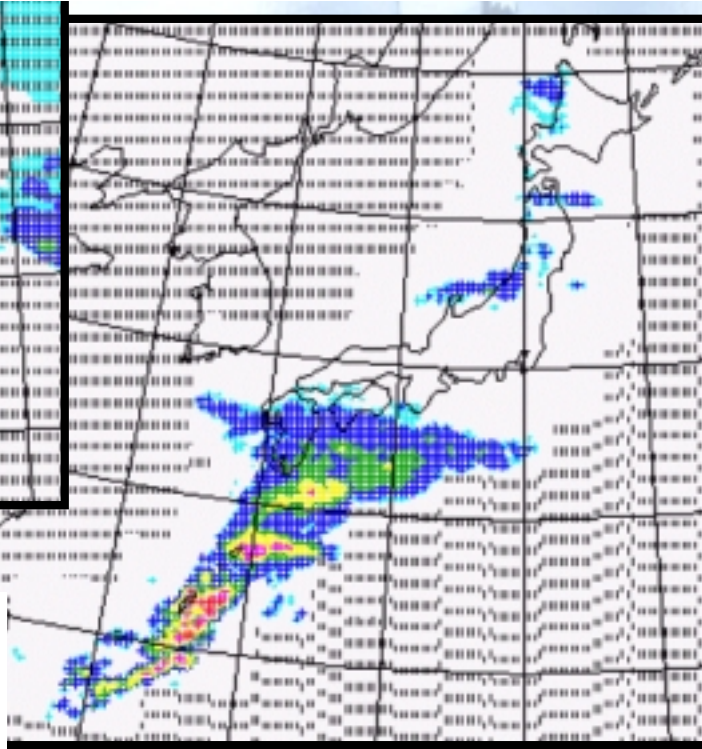


# ***Rain Data Assimilation by 4DVAR***

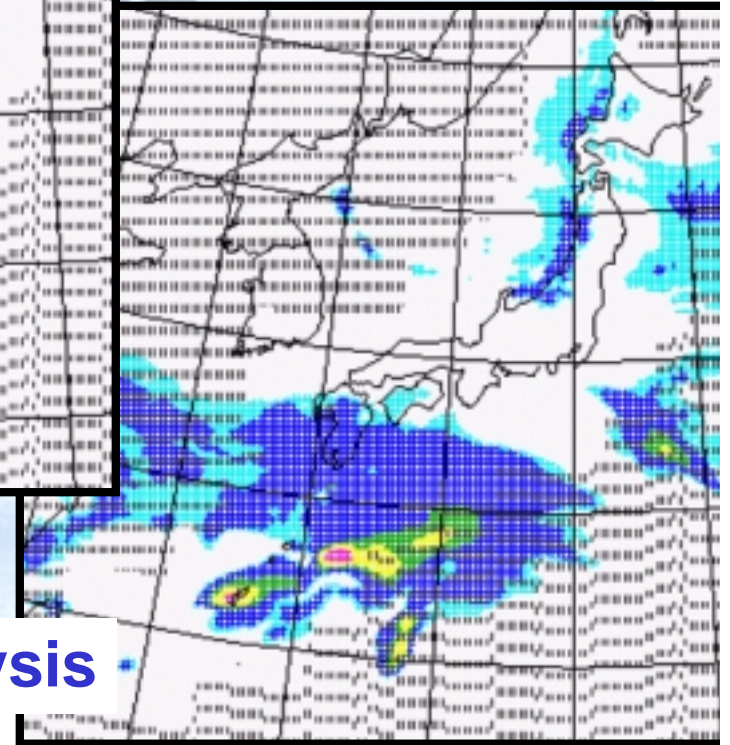
**3hrs Rain Amount of 15hr Forecast  
from 4DVAR Analysis at 00utc 2/12/01  
with assimilation of Radar-AMeDAS data**



**Radar-AMeDAS  
Analysis**



**The Rain Forecast from OI Analysis**



# ***Expectations from GPM for NWP Purpose***

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## **Å Analysis and Forecast**

- Å GPM is expected to contribute on accurate global rain, moisture, cloud and surface analysis with its huge amount of observations and**
- Å On frequent watch of severe weather systems including tropical cyclones and their accurate analyses.**
- Å Good global analysis will lead good long-term forecast.**
- Å Good global analysis and forecast will lead good regional analysis and forecast.**

## **Å NWP model development**

- Å GPM is expected to contribute on not only producing climatic information but also the developments of NWP cloud, rain and snow fall schemes.**



# ***Numerical Prediction Division of JMA and Joint Researches for Satellites***

## **Å JMA/NPD**

Å Management section (4)

Å Modeling branch (35)

Å Global modeling group (7)

Å Regional modeling group (7)

Å (New) Non-hydrostatic meso-scale modeling group (6)

Å Analysis group (7) .. (analysis scheme and QC)

Å **(New) Satellite group (7) .. (satellite data assimilation)**

Å Application branch (7)

Å Systems branch (11)

## **Å Joint Research for Sat.**

Å **JMA/MSC (8)**

Å **NASDA/EORC (2)**

**We are preparing to use  
increasing satellite data!!**